



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
10.09.1997 Bulletin 1997/37

(51) Int Cl.⁶: **G10L 3/00, G10L 3/02**

(43) Date of publication A2:
02.11.1995 Bulletin 1995/44

(21) Application number: **95302237.3**

(22) Date of filing: **04.04.1995**

(84) Designated Contracting States:
DE ES FR GB IT

(72) Inventor: **Kleijn, Willem Bastiaan**
Basking Ridge, New Jersey 07920 (US)

(30) Priority: **14.04.1994 US 227845**

(74) Representative:
Watts, Christopher Malcolm Kelway, Dr. et al
Lucent Technologies (UK) Ltd,
5 Mornington Road
Woodford Green Essex, IG8 0TU (GB)

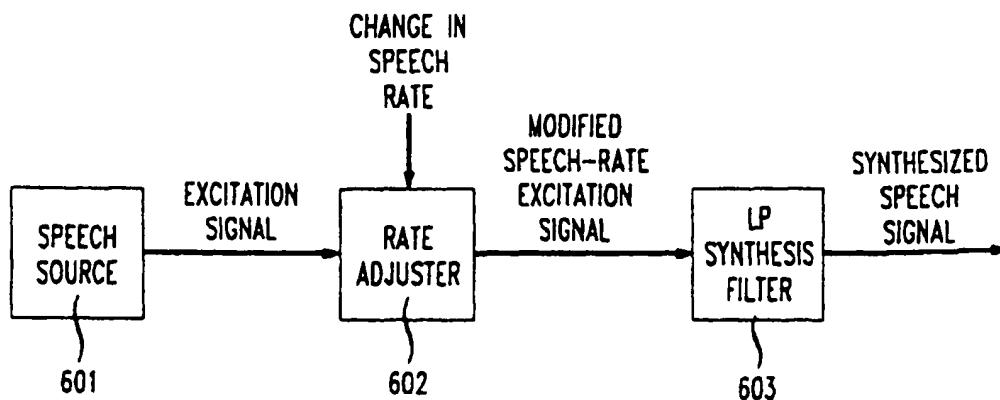
(71) Applicant: **AT&T Corp.**
New York, NY 10013-2412 (US)

(54) **Speech-rate modification for linear-prediction based analysis-by-synthesis speech coders**

(57) Synergy between operations performed by a speech-rate modification system and those operations performed in a speech coding system is exploited to provide a speech-rate modification system with reduced hardware requirements. The speech rate of an input signal is modified based on a signal representing a predetermined change in speech rate. The modified speech-

rate signal is then filtered to generate a speech signal having increased short-term correlation. Modification of the input speech signal may be performed by inserting in the input speech signal a previous sequence of samples corresponding substantially to a pitch cycle. Alternatively, the input speech signal may be modified by removing from the input speech signal a sequence of samples corresponding substantially to a pitch cycle.

FIG. 6



BEST AVAILABLE COPY



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 2237

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 4 709 390 A (ATAL BISHNU S ET AL) 24 November 1987 * abstract; figures 6,7 * * column 3, line 8 - line 12 * * column 7, line 30 - column 8, line 25 *	1-3,5,6,9,10,13-17,20-23	G10L3/00 G10L3/02
Y	idem	24,25	
E	EP 0 714 089 A (OKI ELECTRIC IND CO LTD) 29 May 1996 * figure 8 * * page 3, line 10 - line 15 * * page 8, line 25 - page 10, line 13 *	1-3,5-23,25	
E	EP 0 726 560 A (ROCKWELL INTERNATIONAL CORP) 14 August 1996 * page 2, line 44 - line 59 * * page 3, line 54 * * page 5, line 25 - page 6, line 15 *	1,5,9,10,13,16,17	
Y	EP 0 564 669 A (SEL ALCATEL AG ;ALCATEL PORTUGAL SISTEMAS DE C (PT)) 13 October 1993 * abstract *	24	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G10L
Y	GB 2 254 524 A (NOKIA MOBILE PHONES LTD) 7 October 1992 * abstract *	25	
A	EP 0 573 358 A (THOMSON CSF) 8 December 1993 * abstract * * column 3, line 39 - line 49 * -/--	1,13,24,25	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 April 1997	Examiner Krembel, L
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document</p>			

EPO FORM 1503 (01.91) (P/MCDU)



European Patent
Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid.
- namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions.

namely:

- see sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid.
- namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.
- namely claims: 1-25



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 2237

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	<p>SPEECH PROCESSING, MINNEAPOLIS, APR. 27 - 30, 1993, vol. 2 OF 5, 27 April 1993, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, pages 11-554-557, XP000427849 VERHELST W ET AL: "AN OVERLAP-ADD TECHNIQUE BASED ON WAVEFORM SIMILARITY (WSOLA) FOR HIGH QUALITY TIME-SCALE MODIFICATION OF SPEECH" * page 555, column 1, line 4 - line 8 *</p> <p>-----</p>	1,13	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 April 1997	Examiner Krembel, L
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>Δ : member of the same patent family, corresponding document</p>			

EP0 FORM 1503 (01.01.97) (P01001)



European Patent Office

EP 95 30 2237 - B -

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions, or groups of inventions, namely:

1. Claims 1-25 : Method and apparatus of modifying speech-rate for linear prediction analysis/synthesis speech-coders.
2. Claims 26,27 : Method of modifying speech-rate for signals representing speech and silence, suited for dictation modus.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: _____**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.